

CHAMPION INTERNATIONAL CORPORATION)	DEPARTMENTAL
HANCOCK COUNTY)	FINDINGS OF FACT AND ORDER
BUCKSPORT, MAINE)	AIR EMISSION LICENSE
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After review of the air emission license application, staff investigation reports, and other documents in the applicant's file in the Bureau of Air Quality, pursuant to 38 M.R.S.A., Section 344 and Section 590, the Department finds the following facts:

I. REGISTRATION

A. Introduction

1. Champion International Corporation (Champion) was issued Air Emission License A-22-71-C-R on October 28, 1987. The license was subsequently amended on November 7, 1990, (A-22-71-D-M) on February 10, 1994, (A-22-71-H-M), on October 24, 1994, (A-22-71-I-M), on January 17, 1996, (A-22-71-J-A), on January 18, 1996, (A-22-71-K-A), on February 3, 1997, (A-22-71-L-M), on June 12, 1998, (A-22-71-O-M).
2. Champion has subsequently requested an amendment on May 4, 1998, to their Air Emission License in order to install a combined cycle gas turbine facility. The turbine facility will include a gas turbine and associated electrical generator capable of producing approximately 175 MW, a heat recovery steam generator, and ancillary equipment. This amendment also includes the addition of natural gas to boiler #8.

B. Emission Equipment to be Licensed

Fuel Burning Equipment

Equipment	Licensed Capacity (MMBtu/hr)	Fuel Type, %Sulfur	Nominal Design Firing Rate*	Stack # and Stack height
Turbine	1963 2082	Natural Gas Fuel Oil, 0.05	1.963 MMscf/hr 14,871 gal/hr	GT, 240 feet

*Assuming 1000 Btu/scf for gas and 140,000 Btu/gal for oil

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C. Application Classification

The modification of a major source is considered a major modification based on whether or not expected net emission increases exceed the "Significant Emission Increase Levels" as given in Maine's Air Regulations.

The net emission increases are determined by subtracting the average actual emissions of the two calendar years preceding the application for the modification, together with contemporaneous increases and decreases, from the maximum future license allowed emissions, as follows:

<u>Pollutant</u>	<u>95/97* Ave. Actual</u>	<u>Future License</u>	<u>Net Change</u>	<u>Sig.Level</u>
	(TPY)	(TPY)	(TPY)	(TPY)
PM	326	350.8	24.8	25
PM ₁₀	326	340.8	14.8	15
SO ₂	3225	3264.8	39.8	40
NO _x	1526	1563.9	37.9	40
CO	528	627.5	99.5	100

* 1996 was not a representative year because of the unusual curtailment of electricity production.

In order to net out of Prevention of Significant Deterioration (PSD) and New Source Review (NSR), Champion is accepting new facility wide emission caps designated as future license allowed in the table above. Champion's boilers No. 5, 6, 7, and 8 and the turbine are subject to the above emission limits, and compliance with the emission limitations will be demonstrated through monitoring and recordkeeping.

Hancock County is in attainment for all pollutants, including ozone. However, because Hancock County is located in the Ozone Transport Region, VOCs are treated as a nonattainment pollutant for purposes of Nonattainment New Source Review requirements. To determine potential applicability of Nonattainment NSR requirements, all VOC emission increases and decreases at the mill that are contemporaneous with the turbine project and are otherwise creditable must be included with the potential emissions from the turbine. Two projects are contemporaneous with the turbine project. The first project involves a standby diesel fired electrical generator installed in December 1995. VOC emissions from the diesel generator are limited by limiting the number of hours of operation per year to 500 hours. The second project, the optimization project for the thermo-mechanical pulp mill and the speed-up of the #5 paper machine, was approved by

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the Air Bureau in a license revision dated February 3, 1997. The license revision authorized a 19.6 tons per year VOC emission increase from the mill as a result of the project. Combining the allowable VOC emissions increases from these two projects with the potential VOC emissions from the turbine results in the following:

Project	VOC Emissions Increase (tons per year)
Standby Generator	0.2
TMP & #5 Paper Machine	19.6
Gas Turbine	16
Total	35.8

Since VOC emission from the turbine combined with the contemporaneous VOC emission increases from the mill are less than the significant emissions increase threshold of 40 tons per year, the turbine project is not subject to Nonattainment New Source Review.

Conclusions

This modification is determined to be a minor modification and has been processed as such.

II. BEST PRACTICAL TREATMENT

A. Introduction

In order to receive a license the applicant must control emissions from each unit to a level considered by the Department to represent best practical treatment (BPT), as defined in Chapter 100 of the Air Regulations. Separate control requirement categories exist for new and existing equipment as well as for those sources located in designated non-attainment areas. Descriptions of the applicable requirements are provided below under the appropriate headings.

Champion's turbine facility is an electric generation facility, which consists of the following major mechanical plant components:

- One 175 MW combustion turbine generator with advanced dry low NOx burners using natural gas and fuel oil as fuel.
- One unfired heat recovery steam generator [HRSG]; and

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- Auxiliary systems to the main equipment.

Emissions are formed by the combustion of natural gas and fuel oil in the turbine, and are therefore addressed in the BACT analysis.

B. New Emission Units

BPT for new sources and modifications requires a demonstration that emissions are receiving Best Available Control Technology (BACT) as defined in Chapter 100 of the Air Regulations. BACT is a top down approach to selecting air emission controls considering economic, environmental and energy impacts.

Project Description

The amendment will consist of a combined cycle energy generation facility that includes a combustion turbine, heat recovery steam generator (HRSG), a new stack, and ancillary equipment and facilities. The combustion turbine will be connected to an electrical generator which will have an output of approximately 175 megawatts.

Natural gas will be the primary fuel for the turbine. The turbine will also be connected to a fuel oil supply. The oil firing capability provides Champion with fuel supply flexibility in the event that natural gas is unavailable or due to other conditions of the natural gas market. Champion is proposing to limit the use of fuel oil in the turbine to 21,587,040 gallons/year (an amount equivalent to 60 days per year at base load conditions and an average ambient temperature of 15° F). The new turbine system with steam from the HRSG will be tied into the existing steam header system.

The amendment also includes the addition of natural gas to boiler #8. The addition of gas to boiler #8 provides Champion with added flexibility in fuel selection to meet operational needs. The application of natural gas to boiler #8 does not constitute a modification to the boiler.

The gas turbine facility will use dry low NOx burners to limit NOx formation capable of achieving 9 ppm NOx on natural gas. The dry low NOx combustors may be operated in the pre-mix (low NOx mode) down to 50 percent of rated load. Combustion gases from the gas turbine will be directed to the HRSG. The steam from the HRSG will be directed to the existing steam turbine system. Turbine emissions will exit to the atmosphere through one 240 foot exhaust stack.

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The facility is expected to experience approximately 6 planned shutdowns and start-ups per year.

Future operations will consist of operation of the combustion turbine at base load, along with continuous operation of the HRSG. Approximately 119 MW of electricity generated by the combustion turbine will be sold to the energy grid, while about 45 MW will be used by the mill. The steam and electricity generated by the turbine facility will allow Champion to significantly curtail its use of the power boilers. Under normal conditions boilers #5, #6, and #7 will be placed in a standby mode, and boiler #8 will operate at a reduced load in order to provide the additional steam necessary to meet mill demands. The steam produced by the HRSG and boiler #8 will be directed to the mill's existing steam turbines. The turbine project will result in substantial reductions in air emissions from the mill.

Typical operation of the mill will be the operation of the combustion turbine at base load, and the operation of boiler #8 at an annual average heat input capacity of approximately 500 MMBtu/hr. In order to meet short-term peak energy demands, Champion will be licensed to operate boiler #8 at a maximum heat input capacity of 814 MMBtu/hr while the turbine is operating. Champion will not burn coal in boiler #8 while the combustion turbine is operating. Boilers #5, #6, and #7 will be in standby mode. In the event that boiler #8 is down, Champion will operate boilers #5, #6, and/ or #7 to meet the mill's energy needs. Therefore, Champion will be licensed to operate any combination of the four boilers during turbine operation so long as the combined heat input rate of the boilers does not exceed 823 MMBtu/hr.

Champion must also have the ability to operate the mill when the turbine is unavailable. Therefore, in the event that the turbine is down, Champion shall be licensed to operate the power boilers in their current configuration, which includes firing coal in boiler #8. Champion will operate the existing power boilers under the terms and conditions of their current air license which includes the requirement to limit the combined heat input rate of the power boilers to 1266 MMBtu/hr.

Acid Rain Program

In accordance with the Acid Rain provisions, the combustion turbine is an affected unit. Therefore, Champion is required to apply for and obtain a Phase II acid rain permit for the turbine, and is required to obtain allowances to cover SO₂ emissions from the unit. The turbine is also subject to continuous emission monitoring requirements contained in 40 CFR Part 75.

The turbine will meet the definition of an oil-fired unit if Champion burns oil in the turbine for more than 10% of the average annual heat input during the previous three calendar years or for more than 15% of the annual heat input during any one of those calendar years. Oil-fired units that burn gaseous fuel with a sulfur content no greater than 20 grains per 100 standard cubic feet can comply with SO₂ monitoring requirements by using fuel flow monitoring systems and fuel sampling rather than a SO₂ CEMS. The average sulfur content of the natural gas burned in the turbine will be 2 gr/100scf. Part 75 also requires that Champion continuously monitor the NO_x emissions from the turbine, as well as a diluent (either O₂ or CO₂). In addition, as an oil-fired unit, the turbine must also comply with opacity monitoring requirements.

BACT for the Gas Turbine Generator

The gas fired turbine is subject to New Source Performance Standards (NSPS), 40 CFR Part 60, Subpart GG - Standards of Performance for Stationary Gas Turbines, for which construction is commenced after October 3, 1977.

40 CFR Part 60, Subpart GG establishes the following emission limits: Pursuant to 40 CFR Part 60.333 SO₂ is limited to (a) 0.015% by volume @ 15% O₂ on a dry basis or (b) the fuel sulfur content shall not exceed 0.8% by weight.

Pursuant to 40 CFR Part 60.332(a)(1) NO_x is limited based on the following equation:

$$\text{NO}_x - \text{STD} = 0.0075 * (14.4/Y) + F,$$

where STD is the allowable NO_x emissions (percent by volume at 15% O₂ and on a dry basis), Y is a function of the manufacturer's rated load (kilojoules per watt hour), and F is a function of the fuel-bound nitrogen.

NSPS also requires Champion to continuously monitor and record the fuel consumption and the ratio of water or steam to fuel being fired, if a water or steam injection system is utilized for NO_x emission control during oil firing.

While the NSPS does apply, the proposed BACT is substantially more stringent; compliance with BACT will ensure compliance with the NSPS.

Champion has proposed BACT for the gas turbine to be the following:

- | | |
|-------------------------|-------------------------------------|
| Turbine NO _x | - Dry low NO _x combustor |
| | - water injection during oil firing |

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Turbine SO ₂	- Combustion of clean fuels
Turbine CO	- Good Combustion Practices
Turbine PM/PM ₁₀	- Good Combustion Practices, combustion of clean fuels
Turbine VOC	- Good Combustion Practices

A summary of the BACT analysis for each pollutant is discussed below:

Nitrogen Oxides

NOx emitted from combustion sources results from oxidation of both fuel bound nitrogen and atmospheric nitrogen (thermal NOx). Natural gas has very low fuel bound nitrogen so reducing NOx emissions must focus on reducing the thermal NOx. Champion proposes the use of dry low NOx combustors which provide a staging of combustion, resulting in lean fuel-air mixtures throughout the combustion zone thereby minimizing high flame temperatures and thermal NOx formation. Dry low NOx combustors represent the state-of-the-art combustion turbine technology without supplemental control.

Champion evaluated three control options for gas firing: (a) use of dry low NOx combustors with SCR to meet 3.5 ppm NOx; (b) use of dry low NOx combustors without SCR to meet 9 ppm NOx; and (c) the use of dry low NOx combustors without SCR and/or with alternate control technologies to meet 6 ppm NOx.

The advanced dry low NOx combustor with a 9 ppmvd performance guarantee for NOx is expected to have actual emissions of NOx lower than 9 ppmvd. This combustor technology has demonstrated prolonged performance at NOx emission levels in the 4 to 7 ppmvd range. Therefore, BACT includes initially achieving a NOx emission level of 9 ppmvd on a 24-hour average without the use of SCR. If within 21 months after startup, Champion is not able to achieve a NOx emission level of 6 ppmvd on a 24-hour average with the initial combustor installed, Champion shall, within three (3) years after startup install a newer combustor design, catalytic combustion technology, or SCR. In the event that Champion does not meet a NOx performance level of 6 ppmvd within three and a half years after startup without the use of SCR, then Champion shall install SCR control technology, or other control technology as approved by the Department, to control turbine NOx emissions to 3.5 ppmvd on a 24-hour average. BACT for NOx emissions also includes the use of water or steam injection to meet 42 ppmvd NOx on a 24-hour average during oil firing.

Particulate Matter and PM₁₀

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Units firing fuels with low ash content and high combustion efficiency exhibit correspondingly low particulate matter emissions. The most stringent particulate control method demonstrated for gas turbines is the use of low ash fuel such as natural gas and fuel oil.

Therefore, the use of natural gas, fuel oil with a maximum sulfur content of 0.05% by weight, and good combustion control resulting from the use of dry low NO_x combustors is selected as BACT. A particulate matter emission rate of 9 lb/hr when firing natural gas and 17 lb/hr when firing fuel oil meets BACT.

Sulfur Dioxide (SO₂)

SO₂ is formed from the oxidation of sulfur in fuel. The most stringent method of control for SO₂ that has been demonstrated for gas turbines is firing pipeline quality natural gas. The EPA established NSPS for gas turbines which commenced construction, modification, or reconstruction after October 3, 1977. The NSPS limit for sulfur in fuel is 0.8% by weight.

Natural gas from pipelines is expected to contain an average sulfur content of about 2 grains per hundred cubic foot. Fuel oil used in the turbine will contain no more than 0.05 percent sulfur by weight. Champion will also limit fuel oil use to no more than 21,587,040 gallons/year (the equivalent of 60 days per year at baseload operation and an average ambient temperature of 15° F).

The gas turbine will result in reducing actual facility wide SO₂ emissions by approximately 1700 tons per year. Therefore, BACT is the use of pipeline quality natural gas and fuel oil with a sulfur content not to exceed 0.05% by weight.

Carbon Monoxide

Carbon Monoxide (CO) results from the incomplete combustion of gas or fuel oil in the turbine. Dry low NO_x combustors have been demonstrated to achieve low CO emissions over a 50-100% load range, without add-on pollution control. Combustion conditions in a turbine are controlled to achieve a balance between limiting NO_x and CO formation. Most combined cycle projects have satisfied the BACT requirement by demonstrating good combustion control.

Champion also evaluated the use of an oxidation catalyst to control CO. However, CO catalyst oxidation was rejected since it would result in an increase in sulfuric acid (H₂SO₄) mist and is not cost effective for this project.

Therefore, BACT is good combustion practices achieving CO emissions of 9 ppmvd when firing natural gas and 30 ppmvd when firing fuel oil, the use of dry low NOx combustors, and instrumentation and controls. The resulting emission level results in modeled impacts which are less than one percent of the National Ambient Air Quality Standard.

Volatile Organic Compounds (VOC)

VOCs are emitted from gas-fired turbines as a result of incomplete combustion of fuel. Control of VOCs is accomplished by providing adequate fuel residence time, and by optimizing fuel mixing, excess air, and temperature in the combustion zone to ensure complete combustion.

The dry low NOx combustors for Champion's turbine project will provide VOC performance consistent with lower VOC limits found in the RACT/BACT/LAER Clearinghouse. Therefore, BACT is good combustion practices and the operation of dry low NOx combustors limiting VOC emissions to 3.0 lb/hr when burning natural gas and 8.0 lb/hr when burning fuel oil.

III. AMBIENT AIR QUALITY ANALYSIS

A. Overview

ISCST3 and RTDM sequential modeling analyses were performed to show that proposed emissions from the gas turbine along with proposed operating scenarios for the rest of the Champion International Corporation (Champion) facility in Bucksport, in conjunction with other sources, would not cause or contribute to violations of Maine Ambient Air Quality Standards (MAAQS) for SO₂, PM₁₀, NO₂, and CO. No increment analysis was deemed necessary because baseline emissions for the Champion facility were greater than expected actual emissions when the turbine is in operation.

B. Model Inputs

The ISCST3 and RTDM models using sequential meteorological data and a network of receptor grids, were used to address standards in all areas.

All modeling was performed in accordance with all applicable requirements of the Maine Department of Environmental Protection, Bureau of Air Quality (MEDEP-BAQ) and the United States Environmental Protection Agency (USEPA).

Valid 5-year (1988-1992) hourly meteorological on-site databases were used in the ISCST3 and RTDM sequential modeling analyses. The primary wind data was collected at a height of 100 meters at Champion's on-site tower. The secondary wind data and primary temperature data were collected at a height of 15-meters at the on-site tower. Tertiary wind data were collected at the Bangor DEP site. A fourth level of wind data and secondary temperature data were collected at the Bangor FAA site. Secondary, tertiary and fourth level wind speed data were extrapolated up to 100 meters. Tertiary and fourth level wind speed data and secondary temperature data were used only for the 1988 and 1989 databases. All five years of meteorological data had individual and joint recovery rates well above the required 90% level before missing data was filled in.

Missing data were filled using procedures outlined in EPA-450/4-87-013 "On-site Meteorological Program Guidance for Regulatory Modeling Applications, June 1987 (as revised February 1993)". For the 1990-1992 databases, if on-site wind or temperature data was not available, the data was coded as missing. Stability parameters were determined using on-site 15-meter sigma phi and 15-meter wind speed. Secondary stability parameters were determined using on-site 15-meter sigma theta and 15-meter wind speed. For the 1988-1989 databases, the 100-meter wind speed (adjusted to 15-meters) was substituted, if 15-meter wind speed was missing to determine primary and secondary stability parameters. Hourly cloud cover, ceiling height and surface wind speed data from the Bangor FAA site were used to calculate stability if on-site data were missing for 3 or more hours for the 1990-1992 databases. For the 1988-1989 databases, if on-site sigma data were missing for 3 or more hours, the hierarchy of wind speed data mentioned in the previous paragraph was used along with Bangor FAA hourly cloud cover and ceiling height data. Hourly mixing heights were derived from Portland NWS surface and upper air data. A surface roughness length of 100 cm was used. Because RTDM does not accept missing data, the RTDM meteorological database includes a few hours where meteorological judgment was used to fill in missing data.

Stack parameters for Champion are listed in Table IV-1. The proposed turbine stack and existing stacks at Champion are less than their respective formula GEP heights, therefore Champion's stacks were modeled with the appropriate downwash algorithms as required. Since Champion's stacks are greater than $H + 0.5L$ (where H is the height of the controlling structure and L is the lesser of the height or maximum projected width of that structure), no cavity analyses were performed.

Table IV-1 Champion Proposed and Existing Stack Parameters

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Facility/Stack	Stack Base Elev. (m)	Stack Height (m)	GEP Stack Height (m)	Stack Dia. (m)	UTM E (km)	UTM N (km)
Turbine Stack	3.96	73.15	115.68	5.49	515.567	4935.500
Stack 1 (Boilers 5, 6 & 7)	3.96	81.99	116.96	2.60	515.425	4935.415
Stack 2 (Boiler 8)	3.96	110.33	115.50	3.20	515.532	4935.484

Champion's proposed emission parameters for MAAQS compliance modeling are listed in Table IV-2. The emission parameters for Champion's proposed gas turbine are based on maximum license allowed (base), 75%, and minimum (50%) load operating configurations at ambient temperatures of -20°F, 45°F and 90°F. Emission parameters for stack 1 and 2 when the turbine is in operation represent maximum heat input capacity without firing coal in Boiler #8. For the purpose of determining NO₂ and PM₁₀ impacts, all NO_x and PM emissions were conservatively assumed to convert to NO₂ and PM₁₀, respectively.

Table IV-2 Champion's Proposed Emission Parameters

Operating Scenario/ Facility/Stack	SO ₂ (g/s)	PM ₁₀ (g/s)	NO ₂ (g/s)	CO (g/s)	Temp (°K)	Stack Vel. (m/s)
PROPOSED TURBINE OPERATING SCENARIOS Firing Fuel Oil						
Turbine Base -20°F	13.734	2.142	43.848	13.104	477.04	28.907
Turbine Base 45°F	12.978	2.142	41.580	12.600	474.82	27.769
Turbine Base 90°F	11.592	2.142	37.044	11.214	469.26	24.874
Turbine 75% -20°F	11.214	2.142	35.154	9.954	464.82	21.401
Turbine 75% 45°F	10.584	2.142	33.516	9.576	462.59	20.522
Turbine 75% 90°F	9.450	2.142	29.988	9.072	462.04	19.564
Turbine 50% -20°F	8.442	2.142	26.586	15.498	469.26	18.945
Turbine 50% 45°F	8.316	2.142	25.956	8.190	461.48	17.308
Turbine 50% 90°F	7.434	2.142	23.436	9.576	460.93	16.689
PROPOSED TURBINE OPERATING SCENARIOS Firing Natural Gas						
Turbine Base -20°F	1.512	1.134	8.190	4.032	476.48	28.647
Turbine Base 45°F	1.386	1.134	7.560	3.780	471.48	26.411
Turbine Base 90°F	1.260	1.134	6.804	3.402	467.59	23.916
Turbine 75% -20°F	1.260	1.134	6.552	3.276	470.93	22.578
Turbine 75% 45°F	1.134	1.134	6.048	3.024	467.59	21.281
Turbine 75% 90°F	1.008	1.134	5.544	2.772	464.26	19.644
Turbine 50% -20°F	1.008	1.134	5.166	2.646	466.37	18.206
Turbine 50% 45°F	0.882	1.134	4.788	2.520	462.59	17.348
Turbine 50% 90°F	0.882	1.134	4.410	2.394	460.93	16.350
Mill Operating Scenarios with Turbine Operating						
Boilers 5,6 & 7 @ maximum capacity 823 MMBtu/hr with Boiler 8 shutdown						
Stack 1 (Boilers 5, 6 & 7)	83.03	nm	nm	nm	425	26.80
Boiler 8 @ maximum capacity 814 MMBtu/hr (NO COAL) with Boilers 5,6 & 7 shutdown						
Stack 2 (Boiler 8) (NO COAL)	82.16	nm	nm	nm	480	18.22

Note: nm not modeled.

C. Applicant's modeled impacts.

ISCST3 (simple and complex terrain mode) sequential modeling was performed for the 18 Champion turbine operating scenarios listed in Table IV-2. Results are shown in Table IV-3. All annual SO₂, annual and 24-hour PM₁₀ and 1-hour and 8-hour CO averaging period impacts were insignificant in the ISCST3 modeling analyses. Significant impacts occurred for annual NO₂, 3-hour SO₂ and 24-hour SO₂ averaging periods.

Table IV-3. Maximum ISCST3 (simple and complex terrain mode) Impacts from Champion's Proposed Turbine

Pollutant	Averaging Period	Operating Scenario*	Max Impact ($\mu\text{g}/\text{m}^3$)	Receptor UTM E (km)	Receptor UTM N (km)	Receptor Elevation (m)	Class II Significance Level ($\mu\text{g}/\text{m}^3$)
SO ₂	3-hour	Oil Base -20°F	34.67	509.000	4936.000	295.05	25
SO ₂	24-hour	Oil Base -20°F	10.10	509.000	4937.000	260.91	5
SO ₂	Annual	Oil 75% -20°F	0.50	519.000	4943.000	217.93	1
PM ₁₀	24-hour	Oil 50% 90°F	1.83	509.000	4937.000	260.91	5
PM ₁₀	Annual	Oil 50% 90°F	0.11	519.000	4943.000	217.93	1
NO ₂	Annual	Oil Base -20°F	1.58	519.000	4943.000	217.93	1
CO	1-hour	Oil 50% -20°F	65.61	509.000	4937.000	260.91	2,000
CO	8-hour	Oil 50% -20°F	28.47	509.000	4937.000	260.91	500

Because all significant impacts occur in intermediate terrain (terrain elevations above stack top and below plume centerline elevations) a more refined modeling analysis was run using the ISCST3 (simple terrain mode) and RTDM models. Two terrain profiles were used in the RTDM analysis. The first profiled nearby terrain features and the second profiled higher more distant terrain in the Waldo Mountain area. The same receptor grid was used for both modeling analyses. Results in Table IV-4 show all annual NO₂, 3-hour SO₂ and 24-hour SO₂ averaging period impacts were insignificant in both the ISCST3 (simple terrain only) and RTDM analyses. Therefore, further modeling analysis for the turbine with other sources and background is not required.

Table IV-4. Maximum ISCST3 (simple terrain mode)/RTDM Impacts from Champion's Proposed Turbine

Pollutant	Averaging Period	Max Impact ($\mu\text{g}/\text{m}^3$)	Operating Scenario	Receptor UTM E (km)	Receptor UTM N (km)	Receptor Elevation (m)	Class II Significance Level ($\mu\text{g}/\text{m}^3$)
ISCST3 (simple terrain mode)							
SO ₂	3-hour	13.57	Oil 75% -20°F	516.000	4935.600	42.98	25
SO ₂	24-hour	2.45	Oil 75% -20°F	516.000	4935.600	42.98	5
NO ₂	Annual	0.56	Oil 75% -20°F	517.400	4933.200	73.15	1
RTDM							
SO ₂	3-hour	18.28	Oil 75% -20°F	512.200	4936.200	165.81	25
SO ₂	24-hour	2.88	Oil 75% -20°F	512.200	4936.200	165.81	5
NO ₂	Annual	0.24	Oil 75% -20°F	514.000	4932.600	173.13	1

D. Summary

It has been demonstrated that the ambient impacts resulting from Champion's proposed emissions from the turbine are insignificant. Therefore, further

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modeling analysis for the proposed turbine operating scenarios with other sources and background is not required.

ORDER

Based on the above Findings and subject to conditions listed below the Department concludes that the emissions from this source:

- will receive Best Practical Treatment,
- will not violate applicable emission standards,
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants Air Emission License Minor Modification A-22-71-N-A, subject to the conditions found in Air Emission License A-22-71-C-R, in the amendments:

A-22-71-D-M, A-22-71-H-M, A-22-71-I-M, A-22-71-J-A,
A-22-71-K-A, A-22-71-L-M, A-22-71-O-M, and in addition to the
following conditions:

SPECIFIC CONDITIONS

(16) The following shall apply to the conditions in this order as appropriate:

- A. A 24-hour block average basis shall be calculated as the arithmetic average of not more than 24 - one hour block periods. Only one 24-hour block average shall be calculated for one day, beginning at midnight. A valid 24-hour block average must contain at least 12 hours during which operation occurred. Hours in which no operation occurs shall not be included in the 24-hr block average calculation.

(17) Electric Generating System

- A. Champion's gas turbine facility shall consist of a nominal 175 MW F class, combustion turbine generator with advanced dry low NOx combustors, and an unfired heat recovery steam generator [HRSG].

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- B. Champion shall fire only natural gas and fuel oil in the turbine generator. The sulfur content of the fuel oil shall not exceed 0.05% by weight.
- C. Fuel oil use shall be limited to 21,587,040 gallons/year over a 12 month rolling average basis (the annual equivalent of 60 days of turbine operation at base load and an average ambient temperature of 15° F).
- D. Champion shall operate the turbine with water or steam injection during the firing of fuel oil for NO_x emission control.
- E. Visible emissions from the turbine exhaust stack shall not exceed 20% opacity, measured as 6 minute block averages, except for one 6 minute block average period per hour of not more than 27% opacity. Compliance with the opacity limit shall be demonstrated during the initial performance test in accordance with 40 CFR 60, Method 9.
- F. The exhaust from the gas turbine system shall be vented through a 240 foot above ground level stack.
- G. Emissions from the gas turbine shall not exceed the following limits, except during startup, shutdown, and fuel transfer periods:

Pollutant	Fuel	ppmvd	Ave Time	lb/hr	Control Technology
PM	Gas Oil	--	--	9 17	clean fuels Dry low NO _x Technology
PM ₁₀	Gas Oil	--	--	9 17	clean fuels Dry low NO _x Technology
SO ₂	Gas Oil	--	--	12 109	Natural gas fuel oil 0.05% sulfur by weight
NO _x	Gas Oil	9 @ 15% O ₂ 42 @ 15% O ₂	24 hr block ave24 hr block ave	65 348	Dry low NO _x Technology
CO	Gas Oil	9 @ 15% O ₂ 30 @ 15% O ₂	24 hr block ave24 hr block ave	32 104	Good Combustion & Dry low NO _x technology
VOC	Gas Oil	--	--	3 8	Good Combustion control

- H. Compliance with the PM and PM₁₀ lb/hour emission limits shall be determined through stack testing in accordance with 40 CFR Part 60, Appendix A, Method 5.

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- I. Compliance with the SO₂ lb/hour emission limit shall be demonstrated by the natural gas and fuel oil firing rate into the turbine and by fuel sample analysis of the natural gas and fuel oil sulfur content as required in accordance with 40 CFR 60 Subpart GG or by other methods allowed by 40 CFR 75, Appendix D. For any hour during which fuel oil is fired in the turbine, the lb/hr emission limits associated with firing fuel oil shall apply.
 - i. Champion shall perform natural gas fuel sulfur monitoring in accordance to the provision of 40 CFR 60.333. However, if Champion receives approval from EPA, Champion may perform sulfur content monitoring bimonthly. If six months of data show little variability in the sulfur content, Champion may decrease the monitoring frequency to a quarterly basis. After an additional six months of data continue to show little variability, Champion may decrease the monitoring frequency to a semiannual basis. In all cases, Champion must comply with 40 CFR 60.333.
 - ii. For fuel oil, sulfur and nitrogen content monitoring shall be performed on each occasion that fuel is transferred to the storage tank, or by other EPA approved schedules under 40 CFR 60.333. Sulfur and nitrogen content may also be demonstrated by purchase records from the supplier. In all cases, Champion must comply with 40 CFR 60.333.
 - J. Compliance with the NO_x and CO ppmvd emission limits shall be demonstrated by the use of continuous emission monitors (CEMS) meeting the performance specifications of 40 CFR Part 60, Appendix B and F, Part 75, Appendix A and B, and MEDEP Chapter 117, as applicable. When requested by the Bureau of Air Quality, compliance with the NO_x and CO lb/hour emission limits shall either be demonstrated in accordance with 40 CFR 75 or through stack testing in accordance with 40 CFR Part 60, Appendix A (Method 20 for NO_x and Method 10 or 19 for CO), or other method as approved by the MEDEP and EPA.
 - K. Compliance with the VOC lb/hour emission limit shall be demonstrated through stack testing in accordance with 40 CFR Part 60, Appendix A, Method 25A, or other method as approved by the MEDEP.
- (18) Control of NO_x Emissions
- If within 21 months after startup, NO_x emissions from the gas turbine are not being controlled to a level at or below 6 ppmvd on a 24-hour block average basis, Champion shall, within 3 years after startup, either install non-SCR control technology or SCR control technology. If Champion elects to install non-SCR

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control technology, paragraph A applies. If Champion elects to install SCR control technology, paragraph B applies. The inability to achieve the 6 ppmvd emission target in the interim period set forth in this condition does not constitute a violation. The limits provided for in this section are in addition to the NOx limits required in condition 17(G) above.

- A. If within 3 and a half years after startup, NOx emissions from the gas turbine are not being controlled to a level at or below 6 ppmvd on a 24-hour block average basis, within 4 and a half years of startup, Champion shall control NOx emissions with the use of SCR, or an alternative control technology approved by the Department, to a level at or below 3.5 ppmvd on a 24-hour block average basis.
- B. Within 3 and a half years after startup, Champion shall control NOx emissions from the gas turbine with the use of SCR, or alternative control technology approved by the Department, to a level at or below 3.5 ppmvd on a 24-hour block average basis.
- C. Ammonia emissions associated with the use of SCR shall not exceed 10 ppmvd (corrected to 15% O₂) on a 24-hour block average. Compliance with the ammonia ppmvd emission limit shall be demonstrated by the use of a continuous emission monitor (CEM). The monitor shall meet the criteria of the appropriate performance specification of 40 CFR Part 60 Appendix B.

(19) Operating Flexibility

- A. Champion is licensed to fire natural gas in boiler #8 in addition to those fuels already licensed. Champion shall install and utilize low NOx natural gas burners when firing natural gas in boiler #8.
- B. Champion shall not fire coal in Boiler #8 while the combustion turbine is operating.
- C. While the combustion turbine is operating, Champion is licensed to operate boilers #5, #6, #7, and #8 in any combination such that the total combined heat input rate to the boilers does not exceed 823 MMBtu/hr. For a period of time, not to exceed twelve hours, Champion is licensed to bring other boilers on line while the gas turbine is being shutdown or to bring the gas turbine on line while other boilers are being shutdown.
- D. When the combustion turbine is not operating, Champion is licensed to operate their facility in its existing configuration which includes operating power boilers #5, #6, #7, and #8 (including firing coal in boiler #8) in any

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combination such that the total combined heat input rate of the boilers does not exceed 1266 MMBtu/hour.

- E. In order to demonstrate compliance with the total heat input rates to boilers #5, #6, #7, and #8, Champion shall maintain the following records:
1. Daily average heat input into boilers #5, #6, and #7 shall be demonstrated by records of gallons of #6 fuel oil utilized.
 2. Daily average heat input into boiler #8 shall be demonstrated by records of gallons of #6 fuel oil, tons of coal, scf of natural gas, tons of wood and waste wood, tons of sludge, and tons of tire chips utilized.
- (20) The combined emission from Boilers #5, #6, #7, and #8, and the gas turbine shall not exceed the following annual emissions on a 12-month rolling total basis.

Total Annual Emissions

Pollutant	TPY
PM	351
PM ₁₀	341
SO ₂	3265
NO _x	1564
CO	628
VOC	205

- (21) Annual Emission Limit Compliance Demonstration
- A. In order to demonstrate compliance with annual emission limitations in tons per year (12-month rolling total), Champion shall maintain the following records:
1. For the #6 fuel oil fired in boilers #5, #6, and #7, monthly records that indicate the quantity of fuel consumed per month and the percent (%) sulfur content of the fuel by weight, demonstrated by the purchase receipts from the supplier;
 2. For the #6 fuel oil, tons of coal, scf of natural gas, tons of wood and waste wood, tons of sludge, and tons of tire chips fired in boiler #8, monthly records that indicate the quantity of each fuel consumed per month;
 3. For boilers #5, #6, #7, and #8, daily average NO_x CEMS data in lb/MMBtu for each boiler;
 4. For boiler #8, daily average SO₂ CEMS data in lb/MMBtu;

5. For the turbine, the number of hours that the turbine fires both gas and fuel oil during each month;
 6. For the turbine, monthly fuel use for both natural gas and fuel oil; and
 7. For the turbine, hourly NO_x CEMS data and daily totaled NO_x mass emissions.
- B. In order to document compliance with the annual emission limitations for boilers #5, #6, #7, #8, and the gas turbine in tons per year (12-month rolling total), Champion shall, on a monthly basis, calculate and record the 12-month rolling total tons of PM, PM₁₀, SO₂, NO_x, and CO in accordance with the following.
1. The following heat content values shall be used:

Type of Fuel	Heat Content	Moisture Basis
#6 fuel oil	0.15 MMBtu/gal	n/a
Coal	13,000 Btu/pound	n/a
Wood	9 MMBtu/ton	50%
Sludge	4 MMBtu/ton	70%
Tire Chips	31 MMBtu/ton	n/a
Natural gas	1,000 Btu/scf	n/a

2. Monthly heat input values (MMBtu/month) shall be calculated by multiplying the monthly fuel consumption values for each boiler by the heat content of the fuel given in the above table. For boiler #8, total heat input shall be determined by summing the individual heat input of each fuel burned in the boiler during the month.
3. PM and PM₁₀ Emissions
For boilers #5, #6, #7, and #8, Champion shall calculate PM and PM₁₀ emissions using the current emission limit for each boiler (in lbs/MMBtu) in conjunction with the monthly heat input (MMBtu/month) supplied to each boiler.

For the turbine, Champion shall determine the monthly emissions by multiplying the licensed PM and PM₁₀ emission limits (lb/hr) for gas and oil by the number of hours that the turbine fires each fuel in a given month.

4. SO₂ Emissions

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For boilers #5, #6, and #7, Champion shall calculate SO₂ emissions using EPA's AP-42, "Compilation of Air Pollutant Emission Factors," the average sulfur content of the #6 fuel oil, the heat content of #6 fuel oil, and the monthly heat input supplied to each boiler (MMBtu/month).

For boiler #8, SO₂ emissions shall be calculated using CEMS data that provides a daily average emission rate expressed in lb/MMBtu. Daily average emission rates shall be used to calculate a monthly average emission rate. The monthly average emission rate will then be multiplied by the total monthly heat input into boiler #8 to obtain monthly emissions.

For the gas turbine, Champion shall calculate SO₂ emissions by using fuel flow monitoring (scf/month and gallon/month) and fuel sampling for sulfur concentration.

5. NO_x Emissions

For boilers #5, #6, #7, and #8, Champion shall use NO_x CEMS data that provides a daily average NO_x emission rate for each boiler expressed in lbs/MMBtu. Daily average emission rates shall be used to calculate a monthly average emission rate for each boiler. The monthly average emission rate for each boiler will then be multiplied by the monthly heat input into each boiler to obtain monthly emissions.

For the gas turbine, Champion shall use a NO_x CEMS to determine NO_x emissions from the turbine on an hourly basis. Hourly mass emission rates will be totaled to obtain the actual monthly emissions from the turbine.

6. CO emissions

For boilers #5, #6, #7, and #8, Champion shall calculate CO emissions by multiplying the licensed CO emission limit for each boiler (in lbs/MMBtu) by the monthly heat input supplied to each boiler.

For the gas turbine, Champion shall use a CO CEMS to determine CO emissions from the turbine on an hourly basis. Hourly mass emission rates will be totaled to obtain the actual monthly emissions from the turbine.

- (22) Champion shall monitor and record the following as specified, for the gas turbine system:

Parameter for the gas turbine System	Monitor	Record Monitor Data
turbine natural gas firing rate	continuously	continuously

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turbine fuel oil firing rate	continuously	continuously
water or steam injection rate	continuously	continuously

The parameter monitors shall be properly maintained, calibrated, and operated at all times the source or process being monitored is operating except for outages not exceeding five percent (5%) of the source operating time on a quarterly basis which are attributable to QA/QC activities, sudden, unforeseen equipment malfunctions or failure not associated with operator error, poor maintenance or any other reasonably preventable condition.

The fuel oil and natural gas fired into the turbine shall be monitored by fuel flow monitors operated in accordance with the manufacturers specifications.

- (23) Continuous Emission Monitors (CEMS) and Monitoring
- A. The combustion turbine shall be equipped with continuous emission monitoring equipment for nitrogen oxides, carbon monoxide, diluent gas (oxygen or carbon dioxide), and opacity (if the turbine becomes an oil fired unit).
 - B. The continuous monitors must satisfy the applicable performance specifications in 40 CFR Part 60, Appendices B&F, Part 75, Appendices A&B, and Chapter 117 of the MEDEP regulations.
 - C. Performance specifications, monitor location, calibration and operating procedures and quality assurance procedures for each monitor must be submitted to the Bureau of Air Quality for review and approval at least 60 days prior to expected start-up.
 - D. Champion shall notify the Bureau of Air Quality in writing of the date on which the initial performance testing of the CEMS begins at least 30 days prior to such a date.
 - E. All data shall be monitored and recorded continuously, except for periods of QA/QC procedures, in accordance with Chapter 117 of the MEDEP regulations.
 - F. Champion shall maintain records for the gas turbine for:
 - i. Hours of operation, including startup, shutdown, and any other down time; and
 - ii. Malfunctions of the air pollution control system.
 - G. In the event that Champion uses a split scale NOx CEMS with a lower scale at 1-10 ppm and an upper scale at approximately 10-250 ppm, Champion shall be permitted to modify the calibration method in 40 CFR Part 60, Appendix B & F in order to calibrate their NOx CEMS across two scales, with only one point required to be calibrated in the lower end scale.

(24) Turbine Startup/ Shutdown, Fuel Transfer, Turbine Cleaning, and Initial Commissioning

A. Champion shall minimize emissions from the gas turbine to the maximum extent practicable during startup and shutdown, during fuel transfer, under maintenance or adjustment conditions, during equipment cleaning conditions, and during initial gas turbine commissioning by following proper operating procedures to minimize the emission of air contaminants to the maximum extent practical.

1. Turbine startup shall be defined as that period of time from initiation of combustion turbine firing until the unit reaches steady state load operation. Steady state operation shall be reached when the combustion turbine reaches minimum load (50%) and the steam turbine is declared available for load changes. This period shall not exceed 60 minutes for a hot start, 180 minutes for a warm start, nor 240 minutes for a cold start. A hot start shall be defined as startup when the generating unit has been down for less than 2 hours. A warm start shall be defined as startup when the generating unit has been down for more than 2 hours and less than or equal to 48 hours. A cold start shall be defined as startup when the generating unit has been down for more than 48 hours. Unit shutdown shall be defined as that period of time from steady state operation to cessation of combustion turbine firing. This period shall not exceed 60 minutes.
2. Initial turbine commissioning shall be defined as the period of time from the turbines first fire to the date of the initial performance test, but not later than 180 days after the initial startup.
3. The emission limitations of Condition (17)(E) and (17)(G) shall apply at all times, except during initial turbine commissioning, turbine startup/shutdown conditions, turbine cleaning conditions, and during fuel transfer. Startup, shutdown, turbine cleaning, and fuel transfer exemptions shall apply for the period of time from the turbine's first fire until the MEDEP amends the license to include new limits which would apply during startup, shutdown, turbine cleaning, and fuel transfer periods. Within twelve months from the initial performance testing required by Condition (25), Champion shall propose to the Bureau of Air Quality, numerical emission limits to apply during turbine startup, shutdown, turbine cleaning, and fuel transfer conditions. Continuous emission monitoring and/or stack test data gathered during startups, shutdowns, turbine cleaning, and fuel transfers or other data acceptable to MEDEP shall be considered as the basis for these limits.

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4. A fuel transfer mode shall be defined as the period of time during which the fuel fired in the turbine is switched from fuel oil to gas or gas to fuel oil. This period shall not exceed 30 minutes.

5. A turbine cleaning period shall not exceed 30 minutes.

(25) Acid Rain Requirements

A. Champion shall comply with the applicable Federal acid rain program requirements codified in 40 CFR Parts 72, 73, 75, 77, and 78.

B. By January 1, 1999, or 24 months before commencing operations, whichever is later, Champion shall apply for a permit pursuant to 40 CFR, Part 72, as a Phase II Acid Rain facility. A copy of the permit application shall be sent to the EPA when filing to the DEP.

C. Champion shall obtain and hold in the EPA allowance Management System, sufficient Acid Rain allowances for each ton of SO₂ emitted annually in accordance with the requirements of 40 CFR, Part 72, 73, 75, 77, and 78.

(26) The gas turbine system is subject to and shall comply with the requirements of the Federal New Source Performance Standards 40 CFR Part 60, Subparts A (General provisions), and Subpart GG (Stationary Gas Turbines).

A. Champion shall comply with the notification and recordkeeping requirements of 40 CFR Part 60.7.

B. Champion shall monitor the sulfur content of the natural gas and the fuel-bound nitrogen and sulfur content of the fuel oil as described in 40 CFR, Part 60, Subpart GG or by a frequency as approved by the MEDEP and EPA except that monitoring of the fuel-bound nitrogen in natural gas shall not be required pursuant to EPA policy.

C. When using water or steam injection to control NO_x emissions, Champion shall continuously monitor and record the fuel consumption and the ratio of water or steam to fuel oil being fired into the turbine on an hourly block average basis. Records shall be maintained according to Condition (26) and 40 CFR Part 60, Subpart GG.

(27) Performance Tests

A. Champion shall conduct the following initial performance tests within 60 days after achieving the maximum production rate at which the plant will be operated but not later than 180 days after the initial startup. All testing shall

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comply with all of the requirements of the MEDEP Compliance Test Protocol and with 40 CFR Part 60, as appropriate, or other methods approved by MEDEP and EPA. A representative of the MEDEP or Environmental Protection Agency (EPA) shall be given the opportunity to observe the compliance testing.

- B. Champion shall install test ports in stack #GT, in accordance with the criteria of 40 CFR 60, Appendix A, Method 1, and test platforms, if necessary, to allow emission compliance testing for the Gas Turbine System.
- C. Champion shall conduct initial performance testing on the gas turbine for nitrogen oxides, carbon monoxide, particulate matter (total and PM₁₀), and volatile organic compounds. Test results shall be reported in the applicable units of the standard.

(28) Champion shall comply with the following:

A. Quarterly Reporting

- 1. The licensee shall submit a Quarterly Report to the Bureau of Air Quality within 30 days after the end of each calendar quarter, detailing the following, for the Control Equipment, Parameter Monitors, Continuous Emission Monitoring Systems (CEMS) required by this license:
 - a. All control equipment downtimes and malfunctions which causes an exceedance;
 - b. All CEMS downtimes and malfunctions in accordance with Chapter 117;
 - c. All downtimes of the above specified parameter monitors;
 - d. All excess events of emission and operational limitations set by this Order, statute, state or federal regulation, as appropriate; and
 - e. A report certifying there were no excess emissions, if that is the case.
- 2. The following information shall be reported for each excess event:
 - a. Standard exceeded;
 - b. Date, time, and duration of excess event;
 - c. Maximum and average values of the excess event, reported in the units of the applicable standard, and copies of pertinent strip charts and print-outs when requested;
 - d. A description of what caused the excess event;
 - e. The strategy employed to minimize the excess event; and
 - f. The strategy employed to prevent reoccurrence.

B. Record-Keeping

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1. For all of the equipment parameter monitoring and recording, required by this license, the licensee shall maintain records of the most current six year period and the records shall include:
 - a. Documentation which shows monitor operational status during all source operating time, including specifics for calibration and audits; and
 - b. A complete data set of all monitored parameters as specified in this license. All parameter records shall be made available to the Bureau of Air Quality upon request.
2. The CEMS required by this license shall be the primary means of demonstrating compliance with emission standards set by this Order, statute, state or federal regulation, as applicable. For all CEMS, the licensee shall maintain records of the most current six year period and the records shall include:
 - a. Documentation that all CEMS are continuously accurate, reliable and operated in accordance with Chapter 117, 40 CFR Part 51, Appendix P, and 40 CFR Part 60, Appendices B and F;
 - b. Records of all measurements, performance evaluations, calibration checks, and maintenance or adjustments for each CEMS as required by 40 CFR Part 51 Appendix P; and
 - c. Upon the written request by the Department, a report or other data indicative of compliance with the applicable emission standard for those periods when the CEMS were not in operation or produced invalid data. Methods allowed by 40 CFR Part 75 may be used to demonstrate compliance with applicable emission standards. Evidence indicating normal operations shall constitute such reports or other data indicative of compliance with applicable emission standards. In the event the Bureau of Air Quality does not concur with the licensee's compliance determination, the licensee shall, upon the Bureau of Air Quality's request, provide additional data, and shall have the burden of demonstrating that the data is indicative of compliance with the applicable standard.

C. Stack Testing

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1. The licensee shall conduct emission testing, and demonstrate compliance with the applicable standard within 60 days after receipt of notice from the Bureau of Air Quality to test.
 2. All testing programs shall comply with all of the requirements of the MEDEP Compliance Test Protocol and with 40 CFR Part 60, as appropriate, or other methods approved by the MEDEP and EPA to test.
- (29) This amendment shall be valid until either air emission license A-22-71-C-R is renewed or an initial Part 70 license is issued, whichever comes first.

DONE AND DATED IN AUGUSTA, MAINE THIS DAY OF 1998.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____
EDWARD O. SULLIVAN, COMMISSIONER

PLEASE NOTE THE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application May 4, 1998

Date of application acceptance May 4, 1998

Date filed with the Board of Environmental Protection _____

This Order prepared by Sarah R. Anderson, Bureau of Air Quality